



August 24, 2005

Marlene H. Dortch, Secretary
Federal Communications Commission
Office of the Secretary
445 12th Street, SW
Washington, DC 20554

Re: WT Docket No. 04-356
WT Docket No. 02-353

Dear Ms. Dortch:

Pursuant to Section 1.1206(b)(2) of the Commission's Rules, this is to notify you that on August 23, 2005, Steve Sharkey, Rob Kubik, Chris Kurby, and Jim Krammen of Motorola, met with Scott Delacourt, Stephen Zak, Uzoma Onyeije, Peter Corea, Marty Liebman, David Hu, Peter Trachtenberg, and Peter Daronco of the Wireless Telecommunications Bureau, and Ahmed Lahjouji, Patrick Forster, Jamison Prime, Ron Chase, and Salomon Sathe of the Office of Engineering and Technology regarding the above captioned proceeding and specifically with regard to rules for use of H-Block spectrum.

Consistent with Motorola's previous filings in this proceeding, we expressed the view that adoption of an out-of-band emission limit more stringent than current industry standards, which corresponds to -61 dBm/MHz for GSM, for systems operating in the existing PCS spectrum at 1850-1910 MHz, would require a redesign of GSM equipment and could impact the network design. Such action would therefore have a large negative impact on GSM systems. Because GSM systems are being designed to use multiple time slots to achieve higher data rates, allowing time averaging of power does not significantly impact the emission levels or measurements. While an out-of-band emission limit more stringent than -61 dBm/MHz could be adopted for H-Block only, the impact on equipment would vary greatly depending on the limit and maximum power permitted in the H-block. Motorola also provided information on filter characteristics and power levels that cause a 1 dB degradation of existing PCS systems. Attached is a copy of the presentation used during the meeting.



MOTOROLA

Pursuant to the Commission's Rules, one copy of this notice is being filed electronically with the Commission. If you require any additional information please contact the undersigned at (202) 371-6953.

Sincerely,

/s/ Steve B. Sharkey

Steve B. Sharkey
Director, Spectrum and Standards Strategy

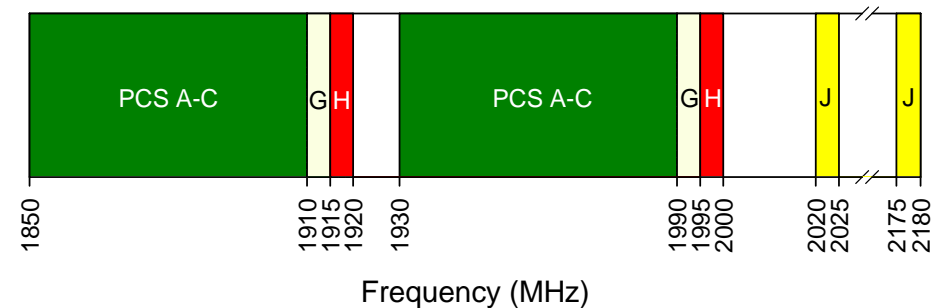
Cc: Scott Delacourt
Stephen Zak
Uzoma Onyeije
Peter Corea
Marty Liebman
David Hu
Peter Trachtenberg
Peter Daronco
Ahmed Lahjouji
Patrick Forster
Jamison Prime
Ron Chase
Salomon Satche



H-Block 1915-1920 / 1995-2000 MHz (FCC Docket 04-356)

MDB TO

August 2005



Agenda

Out-of-Band Emissions

Impact to GSM of -76dBm/MHz

Impact to CDMA of -76dBm/MHz

CTIA PCTEST data

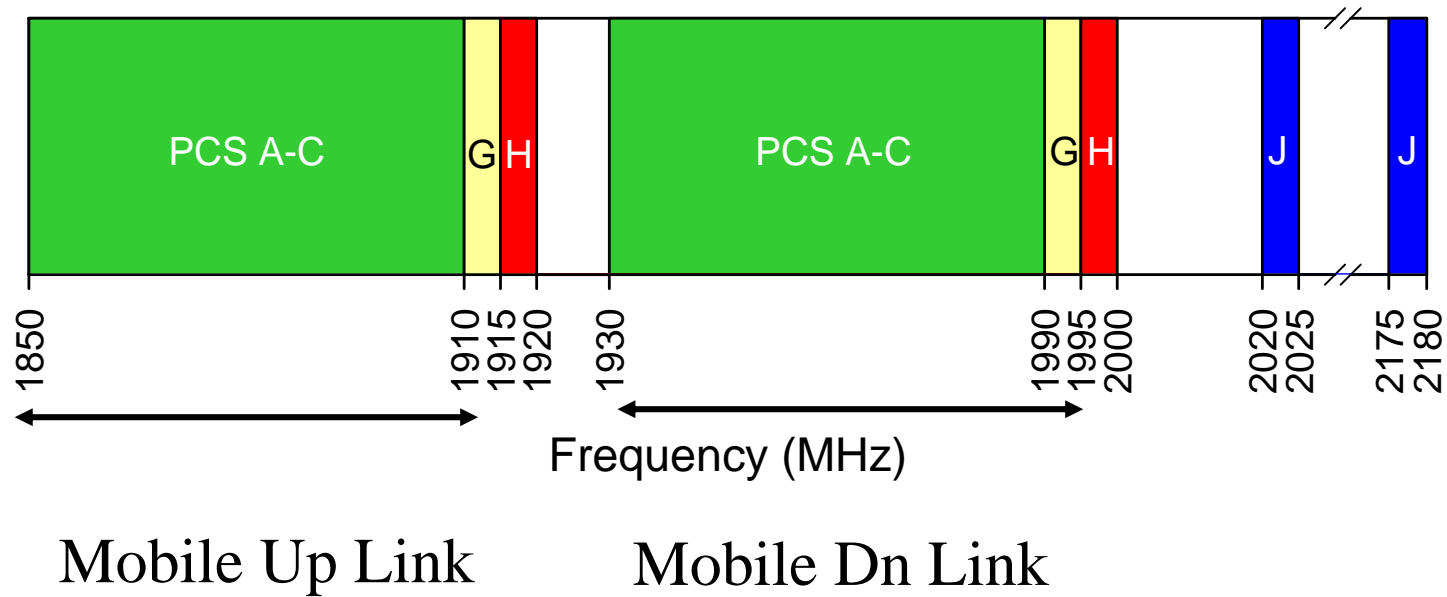
Blocking

Motorola Data

Interference

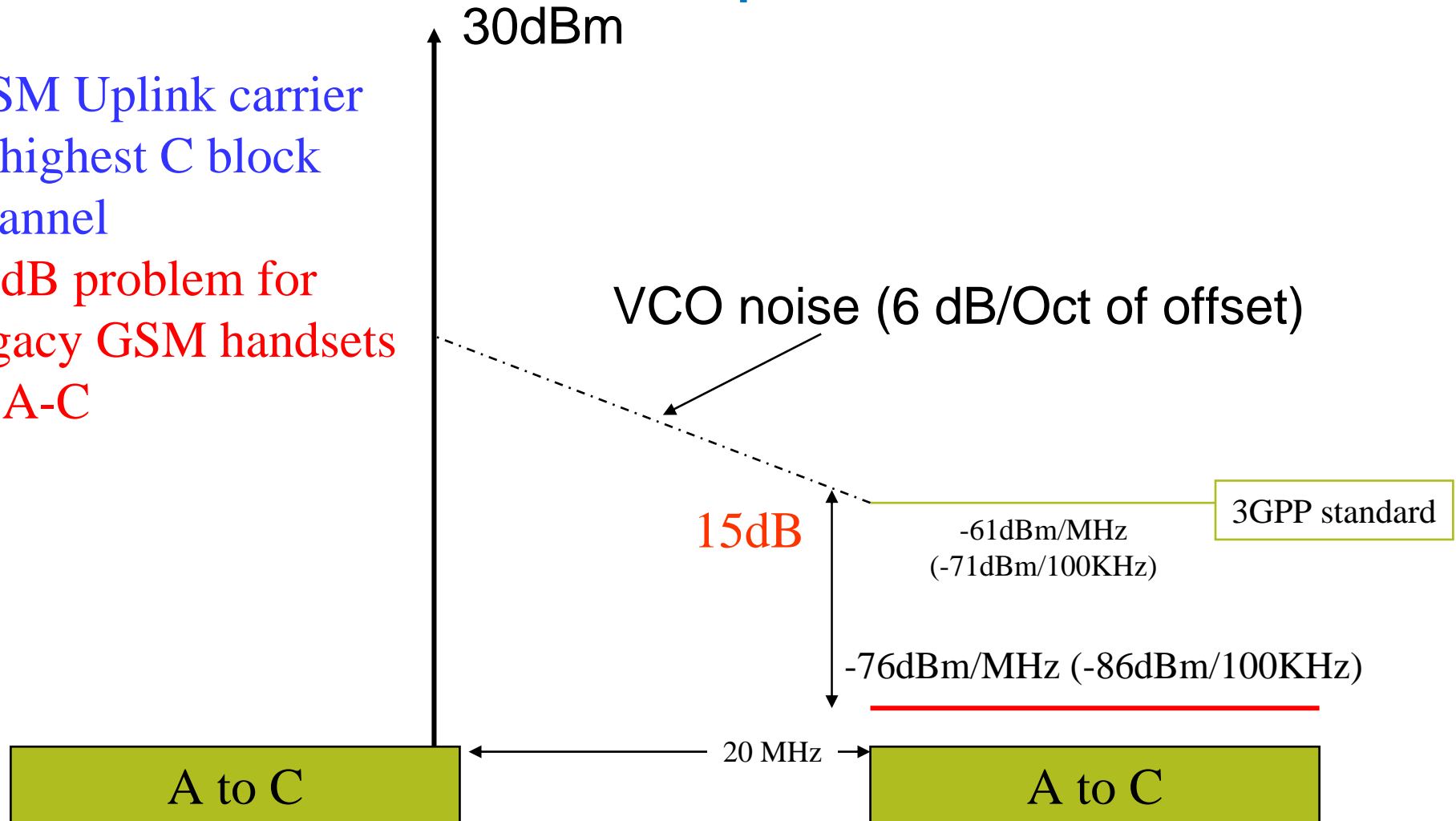
OBE Vs BLOCKER

PCS blocks



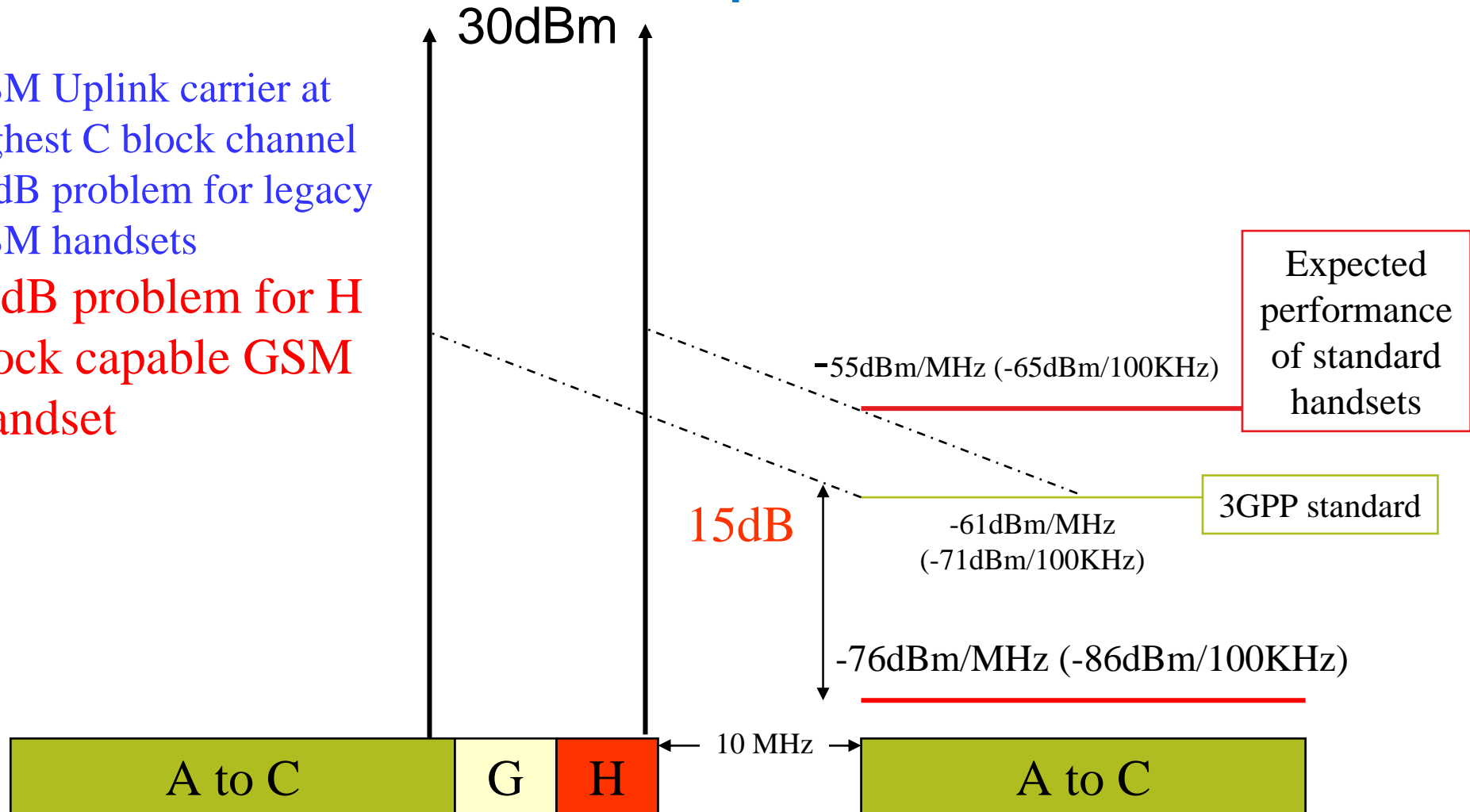
GSM emissions from legacy bands into legacy Rx bands versus Proposed Lower Limit

- GSM Uplink carrier at highest C block channel
- 15dB problem for legacy GSM handsets in A-C



GSM emissions from legacy bands into legacy Rx bands versus Proposed Lower Limit

- GSM Uplink carrier at highest C block channel
- 15dB problem for legacy GSM handsets
- 21dB problem for H block capable GSM Handset



GSM Measurement method

Emissions limit -71dBm/100KHz per 3GPP 45.005 sec 4.3.3.2

Measurement method- Same as 3GPP 45.005 sec 4.2.1

Filter and video BW of 100KHz, with averaging over 50 to 90% of the useful part of the burst averaged over at least 200 bursts

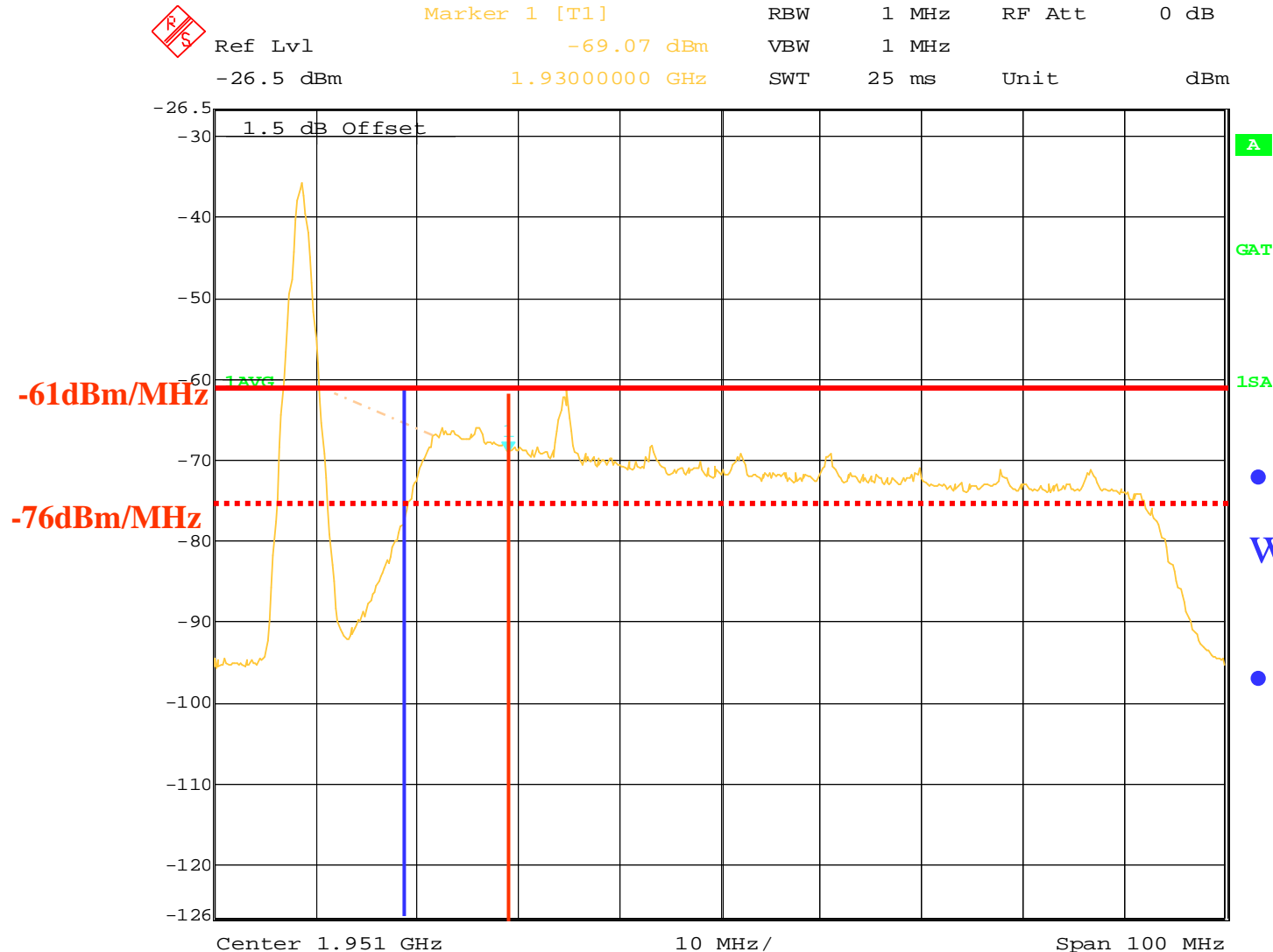
If averaged over the frame the single slot voice emissions would drop
 $10 \cdot \log_{10}(1/8) = -9\text{dB}$

But newer handsets support 4 slots so frame averaging reduces improvement to -3dB.

More Tx time slots >4 will be used in the future, further degrading emissions.

Conclusion: Averaging over the frame provides little help

Specimen Motorola EDGE handset highest C block channel in GMSK mode 1 MHz bw



- Meets -61 dBm/MHz w/o exceptions at 20MHz
- Meets -66 dBm/MHz with *exceptions* at 20MHz

Independent laboratory test data of two CDMA and GSM handsets

6.1.4 Sample D Test Results

Channel	Frequency	Block	EUT Power	OOBE Level (dBm/MHz) @	
				Room Temp.	40° C
585	1864.8	A	Max	- 79.8	- 81.5
585	1864.8	A	10dB below Max	- 82.3	- 81.0
615	1870.8	B	Max	- 79.3	- 78.9
615	1870.8	B	10dB below Max	- 80.4	- 78.1
807	1909.2	C	Max	- 80.4	- 79.0

6.1.5 Sample F Test Results

Channel	Frequency	Block	EUT Power	OOBE Level (dBm/MHz) @	
				Room Temp.	40° C
585	1864.8	A	Max	- 81.0	- 78.5
585	1864.8	A	10dB below Max	- 83.3	- 83.4
615	1870.8	B	Max	- 78.9	- 78.7
615	1870.8	B	10dB below Max	- 83.6	- 83.4
807	1909.2	C	Max	- 71.9	- 72.5
807	1909.2	C	10dB below Max	- 79.8	- 78.4



PCTEST ENGINEERING
LABORATORY, INC.
6660-B Dobbin Road, Columbia, MD 21045 USA
Tel. 410.290.6652 / Fax 410.290.6554
<http://www.pctestlab.com>

FCC H - Block Testing

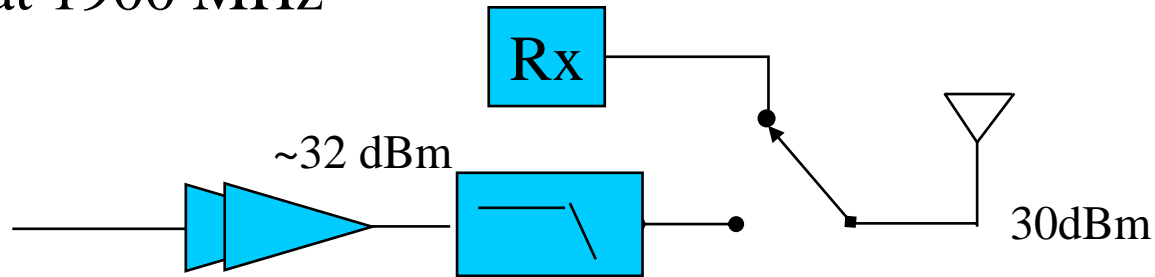
Requested By:
CTIA – The Wireless Association
1400 16th Street NW
Suite 600
Washington, D.C. 20036

Date of Testing:
November 1-19, 2004
Test Site/Location:
PCTEST Lab, Columbia, MD, USA
Test Report Serial No.:
H-241019614-R1.CTIA

- Two specimen GSM handsets tested for noise at **20MHz** offset
- 1 of 2 failed to meet proposed -76dBm/MHz level. Other had 2dB of margin
 - May have missed spurious
- All CDMA handsets tested by PCTEST met proposed -76 dBm/MHz

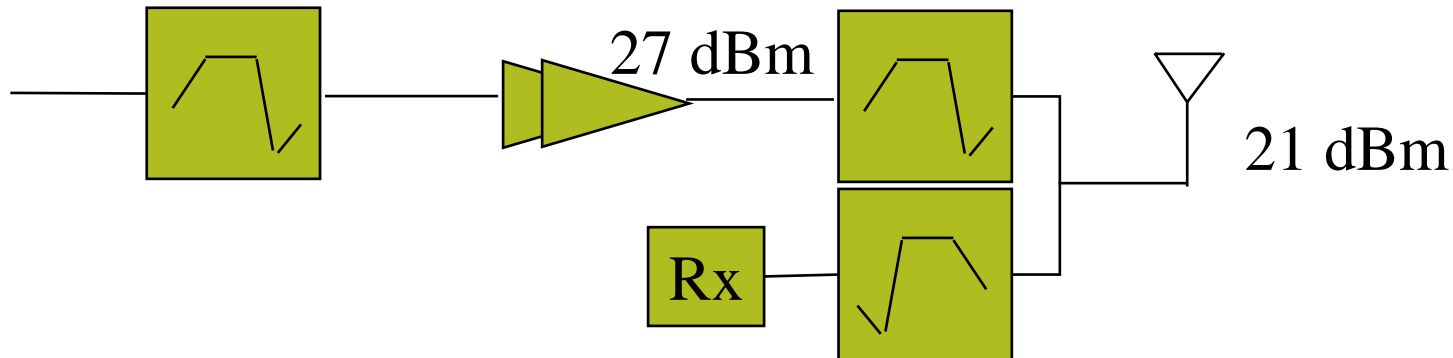
Impact of PA filter to GSM

GSM Tx at 1900 MHz



WCDMA Tx at 1900 MHz

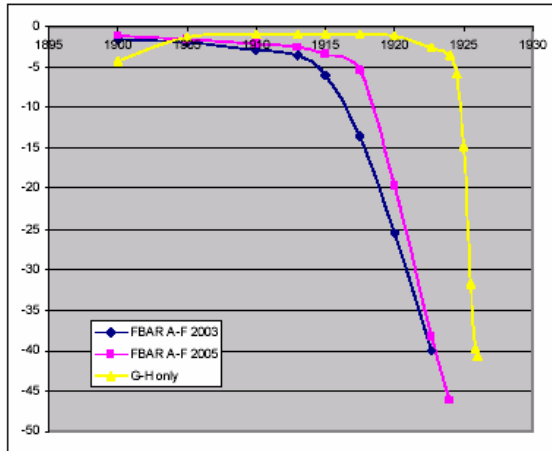
IL = ~ 5 to 6 dB



- Replacing the GSM harmonic filter with the PCS duplexer requires $\sim 36 \text{ dBm}$ PA or 4 watts and > 2 Amps of current
- PA pre-filters do not help much since PA IM folds noise from one side to the other
- This is prohibitive in a handset due to current drain average and peaks and heating
- **Fast roll off Post PA filters on GSM will drastically reduce Tx power and system performance**

CDMA compliance to -76dBm/MHz

- Filtering required to support full duplex operation on CDMA provides compliance to -76dBm/MHz emissions. Same filtering cannot be used on GSM without significantly impacting GSM performance.



- New handsets for G +H only must use new duplexer to achieve Tx selectivity at 1930MHz with only 10MHz of guard band.
 - Agilent claims to be able to build such a filter for G-H only. Commercial availability **and alternate sources are** unknown at this time.



Agilent Tec

- Handsets for A-G or A-H may require a split band (two) duplexers to protect legacy equipment operating in A-C Rx blocks
- Similar case for WCDMA



Blocking

Blocking performance is a measure of the ability of the receiver to receive a desired signal in the presence of a strong interfering signal on any frequency

It is measured by injecting the blocker signal into the receiver under the specified operating point (reference signal), this signal is increased until the Frame Error Rate (FER) or Bit Error Rate (BER) reaches the specified value in the radio standards

CTIA sponsored laboratories performed this by first injecting noise into the system until the target FER/BER is reached and then injected the blocker signal and plotted FER/BER Vs blocker level.

Motorola Specimen GSM and CDMA Blocker Results at room temperature for 3dB desense

Reference level	Blocker		Blocker level (dBm)	
	Freq (MHz)	Offset (MHz)	CW	CDMA
Reference sensitivity +3 dB (-99 dBm)	1925	-5.2	-17.4	-21.7
	1920	-10.2	-13.2	-20.3
	1918.75	-11.45	-12.4	-19
	1917.5	-12.7	-11.0	-17.7
	1912.5	-17.7	-4.3	-9.9
	1911.25	-18.95	-3.8	-5.3
	1910	-20.2	-2.7	-4.2
	1905	-25.2	2.4	>-1.1
	1900	-30.2	5.8	>-1.1
	1850	-80.2	>6.3	>-1.1

Reference level	Blocker level (dBm)	
	CW	CDMA
Measured sensitivity +3 dB (-106.2 dBm)	-26.8	-29.5
	-22.1	-25.6
	-20.3	-24.8
	-18.7	-19.2
	-11.2	-12.2
	-10.7	-11.7
	-9.6	-10.6
	-4.6	-5.6
	-1.1	-2.1
	>6.5	>-1

GSM Blocker Performance

Mobile tuned to 1930.2 MHz

Reference level	Blocker		Blocker level (dBm)	
	Freq (MHz)	Offset (MHz)	CW	CDMA
Reference sensitivity + 3 dB (-101 dBm)	1925	-6.25	-17.0	-21.5
	1920	-11.25	-7.0	-10.0
	1918.75	-12.50	4.0	-3.0
	1917.5	-13.75	>13.5	11
	1912.5	-18.75	>13.5	>13.5
	1911.25	-20.00	>13.5	>13.5
	1910	-21.25	>13.5	>13.5
	1905	-26.25	>13.5	>13.5
	1900	-31.25	>13.5	>13.5
	1850	-81.25	>13.5	>13.5

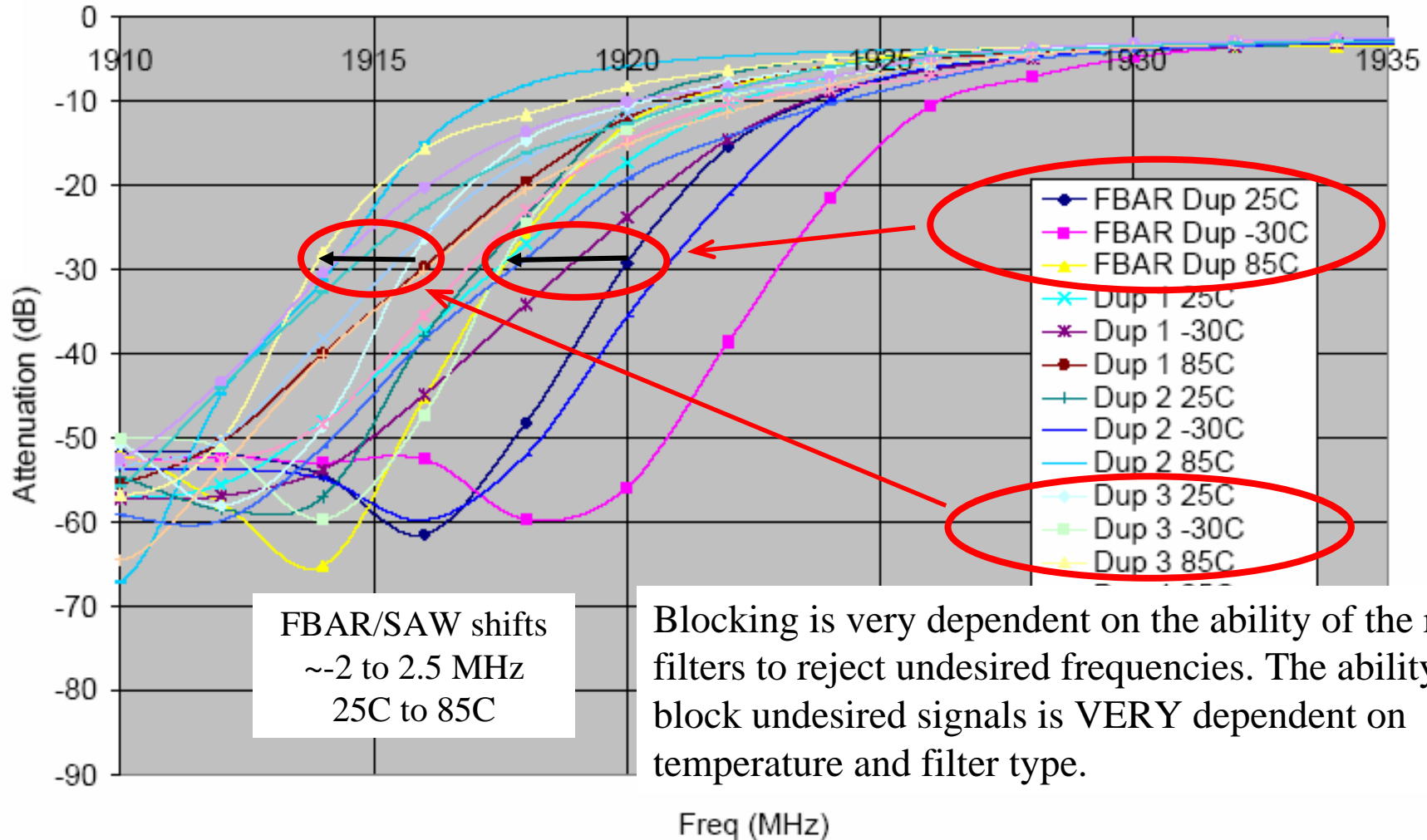
Reference level	Blocker level (dBm)	
	CW	CDMA
Measured sensitivity +3 dB (-103.5 dBm)	-19.5	-23.0
	-9.0	-12.0
	0.0	-5.0
	>13.5	1.0
	>13.5	>13.5
	>13.5	>13.5
	>13.5	>13.5
	>13.5	>13.5
	>13.5	>13.5
	>13.5	>13.5

CDMA Blocker Performance

Mobile tuned to 1931.25 MHz

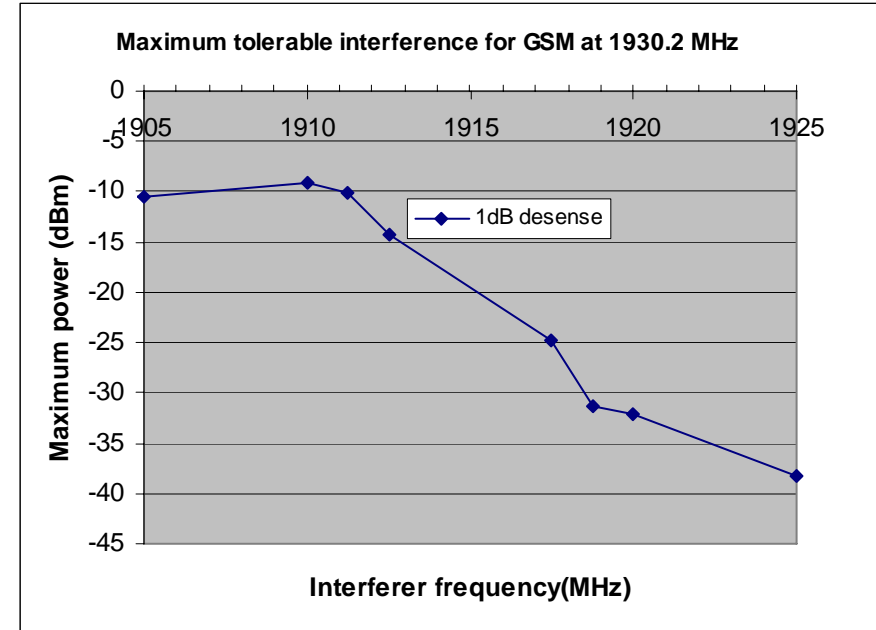
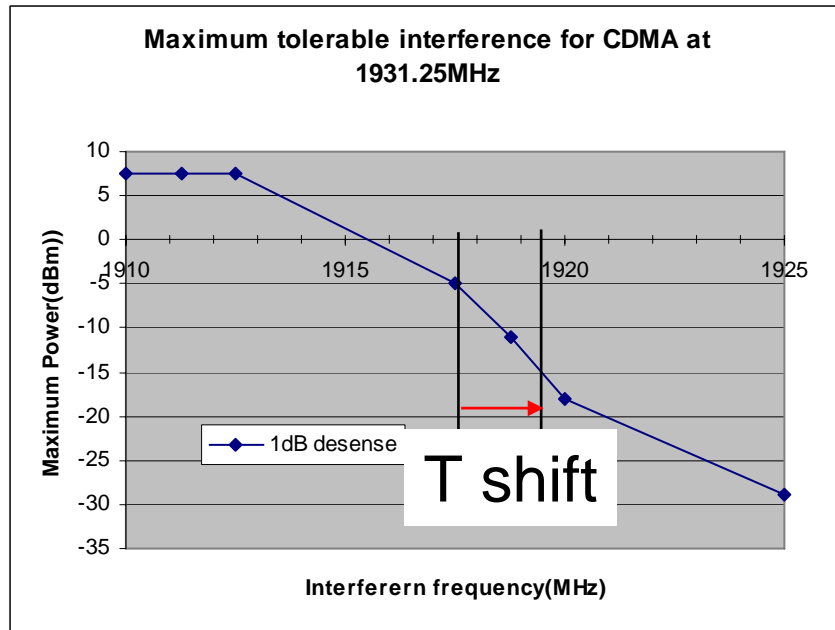
DUPLEXER DATA-Industry data

PCS Duplexer Rx Response to H-block Interferers (All Temps)



OOBE and Blocking H block Limits

Maximum CDMA interference Vs offset for lowest A block channel at elevated temperature



- **Elevated temperature shifts curves to the right ~2MHz**
 - CDMA loses ~2 to 10dB at 1917.5
 - Expect GSM to shift similarly
- **Assume maximum interfering handset power is the propagation loss at 1m above this level (+44dB)**

H block handset power (dBm) based on blocker performance at room temperature for 1 meter distance from a CDMA interferer

Frequency (MHz)	CDMA Rx limit for 1dB desense	GSM Rx limit for 1dB desense	Measurement results for 1dB desense
1920	26 dBm	12 dBm*	12 dBm
1918.75	33 dBm	13 dBm*	13 dBm
1917.5	>33 dBm	19 dBm*	19 dBm
1915	>33 dBm	24 dBm*	24 dBm
1910	>33 dBm	>33 dBm**	33 dBm

- Interference limit is due to GSM handsets receivers
- Does not account for temperature shift at elevated temperatures
- * GSM spec is -26dBm for 3dB desense or 18 dBm at offsets ≥ 3 MHz (12dBm@1dB)
- ** GSM spec is -12dBm at freqs < 1910 MHz

Receiver desense as a function of Tx noise interference in the PCS band

	Impact to CDMA typical Rx					Impact to GSM typical Rx				
	limit of -61 dBm MHz		limit of -66 dBm MHz		limit of -76dBm MHz	limit of -61 dBm MHz		limit of -66 dBm MHz		limit of -76dBm MHz
Typ Rx noise floor dBm	-105.5	-105.5	-105.5	-105.5	-105.5	-117.0	-117.0	-117.0	-117.0	-117.0
BW (MHz)	1.23	1.23	1.23	1.23	1.23	0.14	0.14	0.14	0.14	0.14
Power at offset (dBm/1MHz)	-61	-61	-66	-66	-76	-61	-61	-66	-66	-76
Power transmitted into victim Rx	-60.0	-60.0	-65.0	-65.0	-75.0	-69.5	-69.5	-74.5	-74.5	-75.0
Required Loss for Rx nx lvl dB	45.5	51.5	40.5	46.5	30.5	47.5	53.5	42.5	48.5	42.0
Distance required (m)	1.2	4.7	0.7	2.7	0.4	1.5	5.9	0.8	3.3	1.6
Desense level dB	3	1	3	1	1	3	1	3	1	1

- Handsets will generally be better from Tx noise generation perspective and -66 dBm/MHz will be more indicative of expected performance
- 3GPP spurious into PCS Rx band is -61dBm/100KHz

Achievable Emissions rule per Block

Background:

Premise is to maintain existing environment for A-C

Block	Guard band (GB)	Emissions proposal	comment
A-C	20MHz	-61dBm/MHz	Essential the same as 3GPP but no spurious exceptions. Can go to -66 with spurious exceptions. (handset power of 30dBm)
H	10MHz	-68dBm/MHz	Assumes handset power of 23dBm* (Requires optimized Handset for H)

* Tx power must be reduced at least by $20\log_{10}(10/20) = 6$ dB

Conclusion

Emissions levels should not be set below present 3GPP levels

Would adversely impact all manufactures operators of GSM in A-C

Present GSM handsets which operate in compliance with the
-71 dBm/100KHz level –maintains present PCS environment

Receiver blocking may be an issue when two handsets operate in very close proximity.

Dependant upon receive signal level and frequency offset from
victim handset

GSM handsets are more susceptible than CDMA handsets

Tx power levels should be reduced for H block operation